## CLAIMS

1. In a system for manufacturing a three-dimensional object by deposition of molten material drops on a substrate, an apparatus for producing said molten material drops comprising:

a crucible for holding a reservoir of molten material;

a conically-shaped orifice having a fixed outlet diameter disposed in the bottom of said crucible through which a jet of said molten material flows towards said substrate; and

an oscillating mechanical member for breaking said flow of molten material into said molten material drops, said member having a conically-shaped head for cooperating with said orifice and for varying the effective size of said orifice, said conically-shaped head comprising a slanted radial portion and a tip portion extending through the orifice, the effective diameter $d_{eff}$ of said orifice and said jet being defined by the equation $d_{eff} = [d_0^2 - (d_0 - \delta \tan \theta)^2]^{1/2}$, wherein $d_0$ represents said fixed outlet diameter, $\delta$ represents the amount of said tip portion extending through the orifice, and $\theta$ represents a slant angle corresponding to said slanted radial portion.

2. The apparatus according to claim 1, wherein said crucible comprises:

a first annular surface extending radially from the center of the crucible having an elevation $h_0$ above the lower surface of said crucible, and an outer contour defined by a first diameter $d_1$ greater than $d_0$;

a second annular surface extending radially from the center of the crucible having an elevation $h_1 + h_0$ above the lower surface of said crucible, an inner contour defined by the first diameter $d_1$, and an outer contour defined by a second diameter $d_2$ greater than $d_1$; and

an outer cylindrical wall having an inner contour defined by the second diameter $d_2$.

3. The apparatus according to claim 1, wherein said oscillating mechanical member oscillates at a frequency $f_{opt}$ defined by the equation $f_{opt} = 0.225 U_j/d_{eff}$, wherein $d_{eff}$ is the effective diameter of said jet and $U_j$ is the velocity of said jet through said orifice.